PATENT ABSTRACTS OF JAPAN

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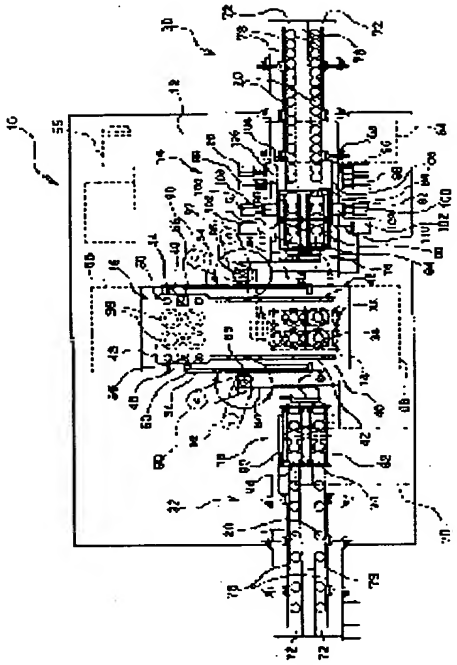
(54) COATING DEVICE FOR CONTAINER

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a container coating device capable of efficiently forming a film for a container with the use of plasma CVD, without increasing cost or size of the device by preventing increase in the output of a high frequency power source, the size of a vacuum pump and the like, or the quantity of these units.
SOLUTION: The device is equipped with a first and second film forming sections 14, 16 in which a thin film is formed on the wall surface of a synthetic resin-made container 20 in a chamber 34 by a plasma CVD method. These first and second film forming sections 14, 16 are successively switched to form the thin film on the wall surface of the container 20.



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CLAIMS

[Claim(s)]
[Claim 1] Coating equipment of the container characterized by arranging two or more said membrane formation processing sections, changing the membrane formation processing section of these plurality one by one, using it in the coating equipment of the container which has the membrane formation processing section which forms a thin film in the wall surface of the container made of synthetic resin within a chamber by the plasma-CVD method, and forming a thin film in the wall surface of said container.
[Claim 2] It is coating equipment of the container which two or more chambers are prepared in said membrane formation processing section in claim 1, and each chamber of said each membrane formation processing circles is on the same periphery, and is characterized by being arranged at equal intervals.
[Claim 3] In the coating equipment of the container which has the membrane formation processing section which forms a thin film in the wall surface of the container made of synthetic resin within a chamber by the plasma-CVD method Two or more (N) arrangement of said membrane formation processing section is carried out. Said chamber Division formation is carried out at a fixed side chamber and a non-fixed side chamber, and said fixed side chamber is placed in a fixed position by each of two or more of said membrane formation processing sections. While said non-fixed side chamber is made into the number corresponding to the fixed side chamber of the membrane formation processing section of the number (N-1) except at least one membrane formation processing section among two or more membrane formation processing sections Coating equipment of the container characterized by being made movable to each membrane formation processing section, and being made combination to each membrane formation processing section.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] Especially this invention relates to the coating equipment of the container which forms a thin film in the wall surface of a container by the plasma-CVD method about the coating equipment of a container.
[0002]
Background Art and Problem(s) to be Solved by the Invention] Current and the container made of synthetic resin have spread as containers, such as a drink.
[0003] For example, high gas barrier property is called for as a container of contents which are easy to oxidize, such as Biel.
[0004] However, the container made from polyethylene terephthalate (PET) which is a container most used as a bevel-use container now cannot satisfy the high gas barrier property for which Biel is asked.
[0005] Generally, in order to guarantee the gas barrier property of PET, the container which made the vessel wall two or more layer structure, and was made into the laminated structure of PET and gas barrier property resin is manufactured.
[0006] replacing this and being observed as a means to offer the container of high gas barrier property recently -- plasma CVD (chemical vapor deposition) -- it is a coating technique by law.
[0007] However, since coating by this plasma CVD is what membrane formation takes time amount, when it tends to perform membrane formation processing of many containers at once, it must enlarge an output, a vacuum pump, etc. of an RF generator, or must increase quantity, and will require cost upwards, and equipment will enlarge it.
[0008] The purpose of this invention is to offer the coating equipment of the container which can prevent cost increase and enlargement of equipment and can perform membrane formation processing efficiently, without enlarging an output, a vacuum pump, etc. of an RF generator, or increasing quantity, when forming a container using plasma CVD.
[0009]
[Means for Solving the Problem] In order to attain said purpose, the coating equipment of the container of this invention is characterized by arranging two or more said membrane formation processing sections, changing the membrane formation processing section of these plurality one by one, using it, and forming a thin film in the wall surface of said container in the coating equipment of the container which has the membrane formation processing section which forms a thin film in the wall surface of the container made of synthetic resin within a chamber by the plasma-CVD method.
[0010] By according to this invention, changing two or more membrane formation processing sections one by one, using them, and performing membrane formation processing By communalizing an RF generator and a vacuum pump, and changing and using these RF generators and a vacuum pump An output, a vacuum pump, etc. of an RF generator can be made small, cost increase and enlargement of equipment can be prevented, and moreover, if carrying in of a container and ejection are performed in other membrane formation processing sections while performing membrane formation processing in a certain membrane formation processing section, membrane formation processing can be performed efficiently.
[0011] For example, it has the two membrane formation processing sections, and can process efficiently by changing the two membrane formation processing sections by turns, and using them as carrying-in appearance of a container is performed in the membrane formation processing section of another side while performing membrane formation processing in one membrane formation processing section.
[0012] In this invention, two or more chambers are prepared, and each chamber of said each membrane formation processing circles is on the same periphery, and can be arranged at equal intervals at said membrane formation processing section.

[0013] By considering as such a configuration, the electromagnetic field between the cavities of each chamber of each membrane formation processi[redacted]rcles can be balanced, and it can pre[redacted] that dispersion arises in the membrane formation condition of each [redacted]amber.
[0014] In the coating equipment of the container which has the membrane formation processing section in which the coating equipment of other containers of this invention forms a thin film in the wall surface of the container made of synthetic resin within a chamber by the plasma-CVD method Two or more (N) arrangement of said membrane formation processing section is carried out. Said chamber Division formation is carried out at a fixed side chamber and a non-fixed side chamber, and said fixed side chamber is placed in a fixed position by each of two or more of said membrane formation processing sections. While said non-fixed side chamber is made into the number corresponding to the fixed side chamber of the membrane formation processing section of the number (N-1) except at least one membrane formation processing section among two or more membrane formation processing sections, it is characterized by being made movable to each membrane formation processing section, and being made combination to each membrane formation processing section.
[0015] While according to this invention changing two or more membrane formation processing sections one by one and performing membrane formation processing in a certain membrane formation processing section If carrying-in appearance of a container is performed in other membrane formation processing sections, it can be efficient and, moreover, small equipment can perform membrane formation processing. Further Since division formation of the chamber is carried out, when the stroke of the receipts and payments of a container to each chamber can be shortened, and a container can be taken in and out smoothly and the chamber is divided up and down, for example, the overall height of equipment can be made low.
[0016]
[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to a drawing.
[0017] Drawing 1 - drawing 7 are drawings showing the coating equipment of the container concerning the gestalt of 1 operation of this invention.
[0018] This coating equipment 10 is what forms DLC (diamond-like carbon) and thin films, such as silicon oxide (SiOx), in the product made of synthetic resin, for example, the skin of the container 20 made from PET, by the plasma-CVD method. it is shown in drawing 1 -- as -- a machine stool 12 -- the two membrane formation processing sections 14, i.e., the 1st membrane formation processing section, and the 2nd membrane formation processing section 16 are mostly put side by side to a mid gear, and the taking-out section 32 is arranged in one side location of the 1st membrane formation processing section 14 by the carrying-in section 30 of a container 20, and the side of another side.
[0019] This container 20 shall have opening 22, the drum section 26 following this opening 22, and the pars basilaris ossis occipitalis 28 that blockades this drum section 26, as it is used as a container of contents which are easy to oxidize, such as Biel, and is shown in drawing 4 and drawing 5 .
[0020] The 1st membrane formation processing section 14 and the 2nd membrane formation processing section 16 perform membrane formation processing to coincidence to four containers 20 using plurality 34, for example, four chambers, respectively.
[0021] this chamber 34 holds a container 20 in the state of a handstand, and also shows it to drawing 3 - drawing 6 -- as -- the height direction -- division formation is mostly carried out with the mid gear at the upper chamber 36 of a non-fixed side, and the bottom chamber 38 of a fixed side.
[0022] The bottom chamber 38 is in the condition of having been fixed to those with 2 set, the 1st membrane formation processing section 14, and the 2nd membrane formation processing section 16 at a time by four, respectively.
[0023] Moreover, in the 1st membrane formation processing section 14 and the 2nd membrane formation processing section 16, the bottom chamber 38 is on the same periphery, and is in the condition of having been arranged at equal intervals, respectively.
[0024] The upper chamber 36 is in the condition of being on 4 same periphery, it having been arranged at equal intervals corresponding to those with 1 set, and the bottom chamber 38, and these four upper chambers 36 having been made movable in the 1st membrane formation processing section 14 and 2nd membrane formation processing section 16 top, and having been made combination to the 1st membrane formation processing section 14 and the 2nd membrane formation processing section 16.
[0025] It is the top face of the base plate 40 which fixed the bottom chamber 38, the rail 42 of a pair is arranged over the 2nd membrane formation processing section 16 from the 1st membrane formation processing section 14, and this rail 42 is made to specifically carry out installation support of the migration rack 44, as shown in drawing 3 .
[0026] This migration rack 44 sets up four guide rods 50 which connected upper limit by the stationary plate 48

on the slide plate 46 which engages with a rail 42, attaches them in this guide rod 50 possible [rise and fall of a movable plate 52], and is in the condition of having fixed 1 set of upper chamber 36 to the inferior-surface-of-tongue side of this movable plate 52.

[0027] The slide plate 46 which the slide plate 46 was fixed to the rod loess cylinder 54 arranged along with the rail 42, and was fixed to this rod loess cylinder 54 can move now between the 1st membrane formation processing section 14 and the 2nd membrane formation processing section 16.

[0028] As shown also in drawing 6 , a movable plate 52 is connected with the cylinder rod 58 of the cylinder 56 set up to the slide plate 46, and rise and fall of it are enabled by the drive of a cylinder 56.

[0029] Moreover, as shown also in drawing 3 - drawing 6 , while an internal electrode 60 is formed in the center position, it connects with the vacuum suction way 62, and as shown in drawing 1 , vacuum suction of the inside of a chamber 34 is carried out by the dry pump 64 and mechanical booster pump 66 in a machine stool 12 at the bottom chamber 38.

[0030] Moreover, the internal electrode 60 is connected to the matching box 68 and RF generator 70 in the machine stool 12 shown in drawing 1 through the metal plate 114 shown in drawing 5 .

[0031] Moreover, the chamber 34 as an external electrode is similarly connected mutually through the metal plate 116.

[0032] Thus, by connecting the chamber 34 as an internal electrode 60 and an external electrode through metal plates 114 and 116, respectively, structure becomes easy and each inter-electrode difference can also be abolished.

[0033] The carrying-in section 30 of a container 20 has the band conveyor 72, the in-line mechanism 74, and the delivery device 76 for carrying in, as shown in drawing 1 and drawing 2 .

[0034] A guide 78 is formed in this band conveyor 72, and it shows a container 20 to two trains.

[0035] An in-line mechanism 74 has the 1st cylinder 96 and the 1st stopper 104, the 2nd cylinder 98 and the 2nd stopper 106, the 3rd cylinder 100 and the 3rd stopper 108, the 4th cylinder 102 and the 4th stopper 110, and the 5th stopper 112 grade. It can align now in the pitch of the chamber [in / for the container carried in in the state of adhesion / the 1st membrane formation processing section 14 and the 2nd membrane formation processing section 16] 34.

[0036] Four grasping members 80 to which the delivery device 76 grasps the drum section 26 of a container 20 are attached in a frame 82 possible [closing motion], and this frame 82 is attached in the ball thread and the spline 86 for rise and fall and level rotation through the revolving arm 84.

[0037] In addition, 94 is the closing motion cylinder of the grasping member 80.

[0038] Moreover, the rotation actuator 88 is attached between a revolving arm 84 and a frame 82, and it enables it to carry out vertical reversal of the frame 82.

[0039] In addition, the ball thread and the spline 86 are connected to the motor 90 for rotation, and the motor 92 for rise and fall in the machine stool 12.

[0040] And in the condition that a frame 82 is located above an in-line mechanism 74, a ball thread and a spline 86 will be dropped by the motor 92 for rise and fall, and the drum section 26 of the container 20 in in-line mechanism 74 location will be grasped by the grasping member 80 by closing the grasping member 80 in the closing motion cylinder 94.

[0041] In this condition, a ball thread and a spline 86 are raised by the motor 92 for rise and fall, and a frame 82 is reversed with the rotation actuator 88. Next, in that condition By the motor 90 for rotation, as shown also in drawing 7 , a ball thread and a spline 86 When it is made to rotate 90 degrees clockwise, a ball thread and a spline 86 are dropped by the motor 92 for rise and fall in the location and the closing motion cylinder 94 opens the grasping member 80, a container 20 will be carried in in the state of a handstand in the bottom chamber 38 of the 1st membrane formation processing section 14.

[0042] Moreover, carrying in of the container into the 2nd membrane formation processing section 16 will be performed by rotating a revolving arm 84 180 degrees counterclockwise from the condition of the continuous line of drawing 1 similarly.

[0043] The taking-out section 32 of a container 20 has the delivery device 76 and the band conveyor 72 for taking out, and since others have the almost same composition as the carrying-in section 30 only by an in-line mechanism 74 not existing, the carrying-in section 30 is stopped for attaching the same sign as the carrying-in section 30, and it omits explanation.

[0044] The delivery device 76 in this taking-out section 32 can perform migration from the condition of the continuous line of drawing 1 to the 1st membrane formation processing section 14 side by rotating a revolving arm 84 90 degrees counterclockwise contrary to the delivery device 76 in the carrying-in section 30, and can perform now migration in the 2nd membrane formation processing section 16 by carrying out rotation rotation 180 degrees clockwise conversely.

[0045] Next, the operating state of the coating equipment 10 of such a container is explained.
[0046] First, in the carrying-in section [redacted] if a container 20 is supplied on a ban[redacted]nveyor 72, while the 2nd cylinder 98 will make the 2nd stopper [redacted] project and will stop migration of the [redacted] container 20, the 1st cylinder 96 makes the 1st stopper 104 project, and stops migration of the container 20 after the 3rd piece.
[0047] The 2nd cylinder 98 draws in the 2nd stopper 106 in this condition, and two containers 20 before the 1st stopper 104 are moved.
[0048] While the 4th cylinder 102 makes the 4th stopper 110 project in this condition and preventing migration of the top container 20, the 3rd cylinder 100 makes the 3rd stopper 108 project, and prevents migration of the 2nd container 20 from a head.
[0049] Subsequently, the 4th cylinder 102 draws in the 4th stopper 110, and the top container 20 is moved, and after the container 20 of this head has contacted the 5th stopper 112, it will be in the condition that four containers 20 are aligned by the pitch of the 1st membrane formation processing section 14 and the 2nd membrane formation processing section 16.
[0050] At this time, the delivery device 76 of the carrying-in section 30 is in the condition of having made the grasping member 80 standing by in the upper part location of an in-line mechanism 74.
[0051] Moreover, the migration rack 44 is located in the 2nd membrane formation processing section 16 side in the rod loess cylinder 54, and the upper chamber 36 is in the condition of being located in the bottom chamber of the 2nd membrane formation processing section 16 38 upper part in a cylinder 56.
[0052] If a ball thread and a spline 86 are dropped by the motor 92 for rise and fall and the grasping member 80 is dropped in this condition, the grasping member 80 will be in the condition which can grasp four containers 20 which aligned according to the in-line mechanism 74.
[0053] If the grasping member 80 is closed in the closing motion cylinder 94 in this condition, the grasping member 80 will be in the condition of grasping the drum section 26 of a container 20.
[0054] Next, when a ball thread and a spline 86 are raised by the motor 92 for rise and fall, ejection of the container 20 from the band conveyor 72 for carrying in will be performed.
[0055] Next, in this condition, if a frame 82 is reversed with the rotation actuator 88, a container 20 will be in a handstand condition.
[0056] Subsequently, when a ball thread and a spline 86 are clockwise rotated 90 degrees by the motor 90 for rotation from this condition, a frame 82 will move above the 1st membrane formation processing section 14.
[0057] Next, a ball thread and a spline 86 are dropped by the motor 92 for rise and fall, and a container 20 is inserted into the bottom chamber 38 of the 1st membrane formation processing section 14.
[0058] Then, if the grasping member 80 is wide opened in the closing motion cylinder 94, a ball thread and a spline 86 are raised by the rise-and-fall motor 92, carrying in of the container 20 to the 1st membrane formation processing section 14 will be completed and a revolving arm 84 will be counterclockwise rotated 90 degrees by the motor 90 for rotation in this condition, it will be in the ejection standby condition of the following container 20.
[0059] Next, the migration rack 44 is moved to the 1st membrane formation processing section 14 side from the 2nd membrane formation section 16 side in the rod loess cylinder 54, a movable plate 52 is dropped in a cylinder 56, and the bottom chamber 38 and the upper chamber 36 are stuck.
[0060] Subsequently, while carrying out vacuum suction of the inside of a chamber 34 and supplying gas in a chamber 34 in this condition using the dry pump 64 and a mechanical booster pump 66, a power source is supplied to an internal electrode 60 and a chamber 34 through RF generator 70 and a matching box 68, a RF is generated, and plasma CVD performs membrane formation processing to the container in the 1st membrane formation processing section 14.
[0061] Here, as gas supplied in a chamber 34, the gas of a hydrocarbon system, for example, acetylene, methane, ethane, ethylene, toluene, benzene, a propylene, a vinylacetylene, methylacetylene, etc. are used.
[0062] Moreover, the gas of a silicon system, for example, a mono silane, JISHISEN, silicon tetrafluoride, etc. may be used.
[0063] In the meantime, the delivery device 76 of the carrying-in section 30 is used, and the following container 20 is carried in to the bottom chamber 38 in the 2nd membrane formation processing section 16.
[0064] When the membrane formation processing by the 1st membrane formation processing section 14 is completed, raise the upper chamber 36, and it is made to move to the 2nd membrane formation processing section 16 side, the upper chamber 36 is stuck to the bottom chamber 38 of the 2nd membrane formation processing section 16, and membrane formation processing in the 2nd membrane formation processing section 16 is performed.
[0065] The delivery device 76 by the side of the taking-out section 32 is used in the meantime, the container 20 which ended the membrane formation processing in the 1st membrane formation processing section 14 is taken

out, and it delivers in the state of erection to up to the band conveyor 72 for taking out, and conveys to the exterior.

[0066] Thus, if ejection of a container 20 and carrying in are performed in the 1st membrane formation processing section 14 of another side, or the 2nd membrane formation processing section 16 when performing membrane formation processing in either the 1st membrane formation processing section 14 or the 2nd membrane formation processing section 16, membrane formation processing can be performed by turns efficiently.

[0067] Moreover, since membrane formation processing is performed in either this 1st membrane formation processing section 14 or the 2nd membrane formation processing section 16, it is not necessary to enlarge neither a vacuum pump nor a RF power outlet, or to increase quantity, and enlargement of cost reduction and equipment can be prevented.

[0068] Furthermore, since division formation is carried out at the upper chamber 34 and the bottom chamber 38, insertion of a container 20 and ejection are easy for a chamber 34, and it can make the overall height of equipment low.

[0069] Moreover, two or more chambers 34 are on the same periphery, and since it is arranged at equal intervals, they can balance the electromagnetic field between the cavities of a chamber 34.

[0070] This invention is not limited to the gestalt of said operation, and is deformable in various gestalten within the limits of the summary of this invention.

[0071] For example, although the gestalt of said operation explained the container filled up with Biel as contents, it can use also as a container filled up with the contents which are [mayonnaise / not only this example but catsup,] easy to oxidize.

[0072] Moreover, with the gestalt of said operation, although the equipment of outside membrane formation was explained, it can also consider as inside membrane formation by connecting an RF generator to an internal electrode and supplying gas to the interior of a container by the well-known approach.

[0073] Furthermore, although the two membrane formation processing sections are prepared, the three or more membrane formation processing sections are changed one by one, and you may make it use them with the gestalt of said operation.

[Translation done.]

* NOTICES *

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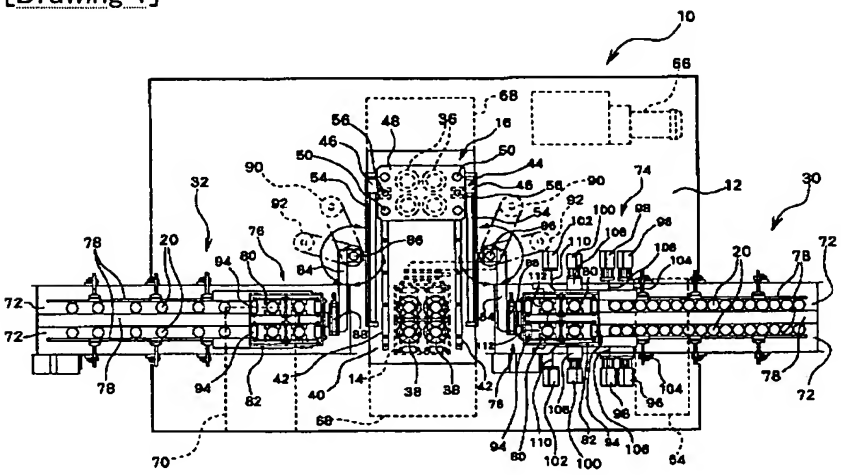
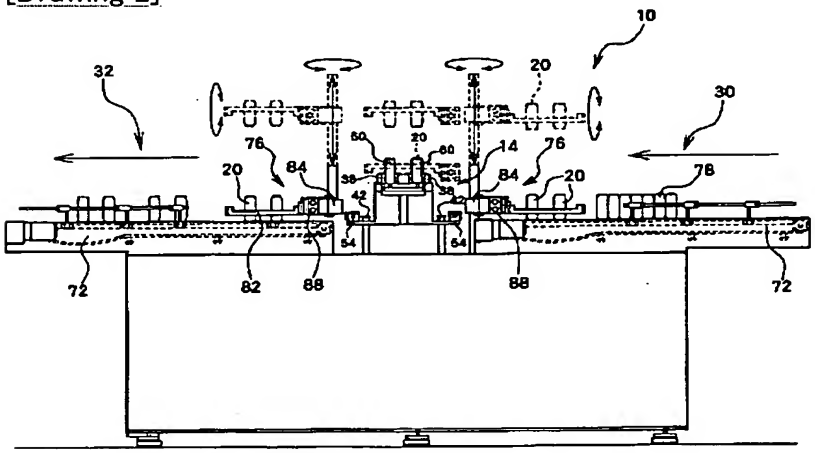
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

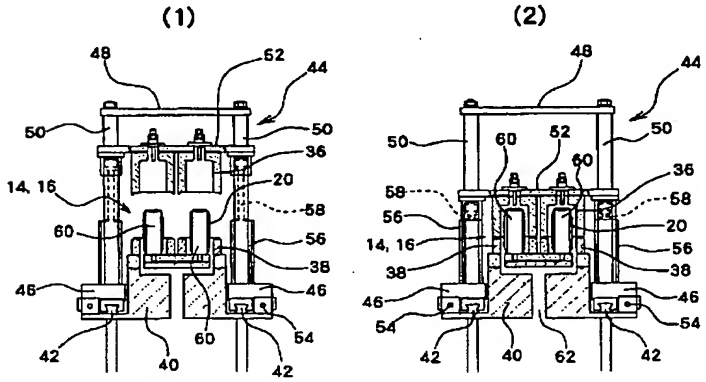
[Drawing 1]



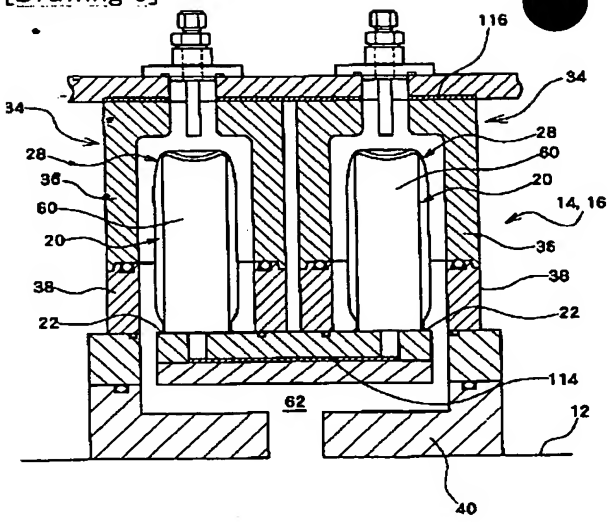
[Drawing 2]



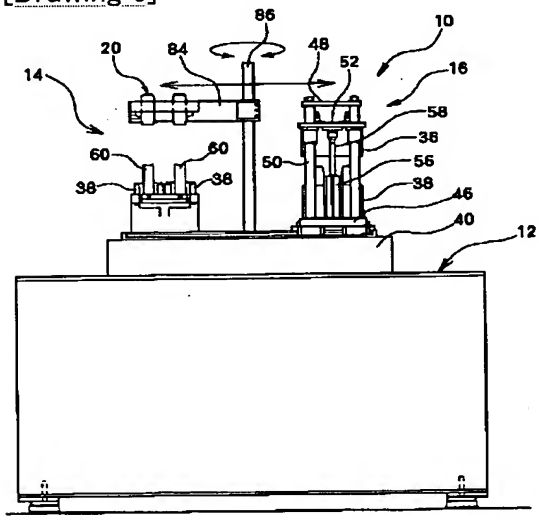
[Drawing 3]



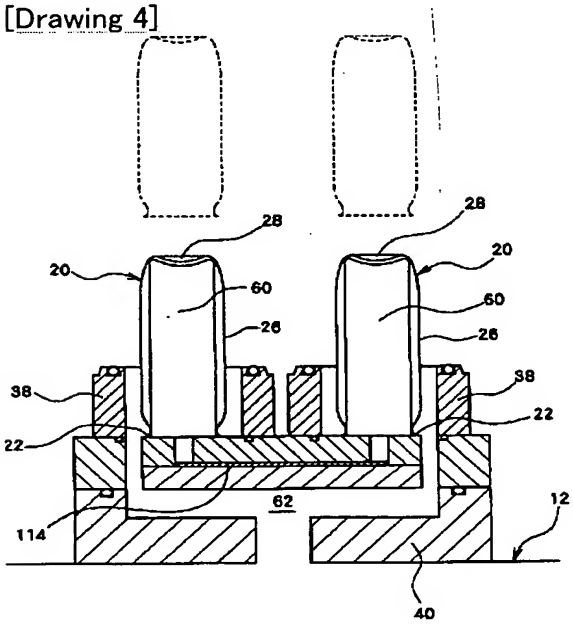
[Drawing 5]



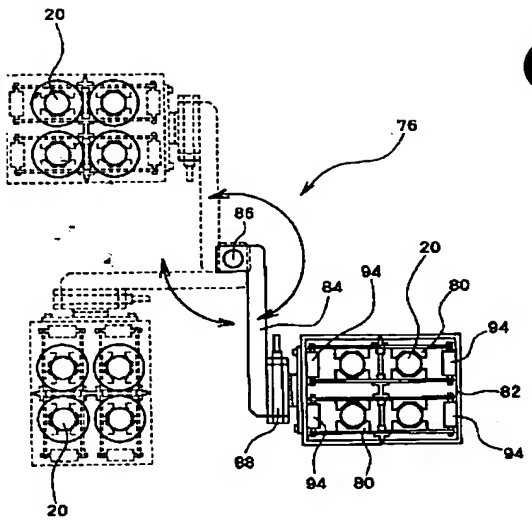
[Drawing 6]



[Drawing 4]



[Drawing 7]



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